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ABSTRACT

This paper argues that while hypermedia and multimedia contain great promise for supporting literacy learners engaged in reading children's literature, software in this area has generally failed to consider the potential of connecting reading and writing experiences within the same electronic environment; reading and writing software has generally been developed for separate instructional purposes. The paper begins by describing the advantages to using children's literature for supporting literacy development. It then describes the multiple advantages of literacy experiences that connect reading and writing around children's literature: cognitive, analytic, social, and pragmatic. It discusses how a passage from James and the Giant Peach was developed as hypermedia "think piece," allowing us the opportunity to consider how reading and writing connections might be developed that are grounded in research on literacy development within traditional, static texts. It show how design elements such as E-mail, a reader response journal, and an electronic bulletin board, used within the reading experience, can support literacy learners by connecting reading and writing with a hypermedia context. Examples of written communication from a fourth grade classroom are described to demonstrrate the power of this type of design to support children's literacy learning in areas such as comprehension, response, critical thinking, and communication. (Contains 23 references.) (Author)

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Paper (M2-202B)

Designing Hypermedia to Connect Reading and Writing through Children's Literature

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Abstract

This paper argues that while hypermedia and multimedia contain great promise for supporting literacy learners engaged in reading children's literature, software in this area has generally failed to consider the potential of connecting reading and writing experiences within the same electronic environment; reading and writing software has generally been developed for separate instructional purposes. The paper begins by describing the advantages to using children's literature for supporting literacy development. It then describes the multiple advantages of literacy experiences that connect reading and writing around children's literature: cognitive, analytic, social, and pragmatic. It discusses how a passage from *James and the Giant Peach* was developed as a hypermedia "think piece", allowing us the opportunity to consider how reading and writing connections might be developed that are grounded in research on literacy development within traditional, static texts. It shows how design elements such as E-mail, a reader response journal, and an electronic bulletin board, used within the reading experience, can support literacy learners by connecting reading and writing within a hypermedia context. Examples of written communication from a fourth grade classroom are described to demonstrate the power of this type of design to support children's literacy learning in areas such as comprehension, response, critical thinking, and communication.

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Using Children's Literature to Support Literacy Learning

Recent work (Atwell, 1987; Norton, 1990) has demonstrated the powerful potential of children's literature to support literacy learning in school classrooms. Quality children's literature increases the amount of reading that takes place inside and outside of school settings (Anderson, 1990). Equally important, quality children's literature can be used to increase the sophistication and variety of children's responses to text , improve children's developing decoding ability, support the development of vocabulary knowledge, increase children's ability to make central inferences, increase children's understanding of important discourse structures, support the development of metacognitive knowledge, and increase children's ability to think critically (Leu & Kinzer, 1991; Shanahan & Tierney, 1991). It is clear that children's literature contains a powerful potential for supporting literacy learners.

Perhaps because of this powerful potential, children's literature has recently found its way into electronic environments. Multimedia versions of children's literature have recently appeared in such products as Houghton Mifflin's Reading Comprehension Series, Broderbund's "Just Grandma and Me", and the software series by Discus. Clearly, electronic publishers are beginning to recognize the potential of children's literature and the new forms of literary experiences that may be developed within hypertext, multimedia, and hypermedia contexts.

Supporting Literacy Learners by Connecting Reading and Writing

Unfortunately, however, while electronic publishers have recognized the importance of children's literature, they have yet to recognize that literacy educators assign an equal importance to experiences that connect reading and writing. Combining reading and writing experiences for literacy learners is important for many reasons: cognitive, analytic, social, and pragmatic.

Cognitively, it is clear that combining reading and writing experiences results in children who learn to both read and write better (Stotsky, 1983). Because both written language modes rely upon similar and related types of knowledge, learning about reading enhances writing ability and learning about writing enhances reading ability (Tierney & Pearson, 1991; Shanahan, 1990). This special relationship has been referred to by various metaphors such as "two sides of the same mirror" (Smith, 1983) or "two sides of the same coin" (Leu & Kinzer, 1991). In each case the special, reciprocal nature of the reading-writing relationship is recognized. This relationship can be effectively exploited in the classroom to simultaneously support academic development in both areas.

In addition, reading and writing, when combined in classroom experiences, can be used as powerful tools to increase students' ability to analyze and think critically about information. Separately, both reading and writing may be used to develop critical thinking skills but when combined, they serve to reinforce each other and produce even greater benefits than if they are used alone (Tierney and Shanahan, 1991). This is an especially important requirement of citizens who wish to participate fully in an economically and interdependent world (Kirsch & Jungeblut, 1986; Langer, Applebee, Mulis, & Foertsch, 1990; National Commission on Excellence in Education, 1983; Ravitch, 1985; The Secretary's Commission on Achieving Necessary Skills, 1991).

Pragmatically, combining reading and writing experiences is also efficient, a quality whose significance should not be underestimated for busy classroom teachers facing increasing demands on instructional time as states and local units mandate new curricular areas. In addition to increasing learning, linking reading and writing experiences can result in a more efficient use of limited instructional. This pragmatic aspect of connecting reading and writing often is often viewed by teachers as more important than any other (Shanahan, 1990).

Combining reading and writing experiences also says something important to literacy learners about the nature of literacy. Literacy is fundamentally a social and communicative act (Daniels, 1991). Readers attempt to understand the meanings assigned by writers and writers attempt to anticipate the meanings assigned by readers (Tierney, 1991). Viewing literacy from this social communications stance is something that is well known to mature readers and writers. Providing separate experiences for reading and writing increases the chance that literacy learners will miss this fundamental aspect about the nature of literacy. As a result, they may be less likely to use literacy in their own lives or to use it less effectively when they do read and write.

Taken together, combining reading and writing creates a powerful context for literacy learners as they simultaneously develop important academic skills, hone the ability to think critically about important issues, meet increasing the content area requirements demanded by our society, and acquire insight about literacy as a social and communicative act. It is surprising, therefore, that publishers who design electronic contexts for learning have generally failed to provide opportunities for literacy learners to engage simultaneously in reading and writing experiences. While the recent cycle of software from school publishers contains both reading and writing within the same CD-ROM environment (e.g., Scholastic's Smart Books or Houghton Mifflin's The Media Experience) they provide reading tasks and writing tasks as separate experiences and, as a result, fail to capture the potential of simultaneous experiences with these two reciprocal modalities of literacy.

The purpose of this paper is to consider how reading and writing might be more effectively integrated within the same literacy experience as children engage in an experience with children's literature. It will present one design possibility for integrating reading, writing, and children's literature; a design that was developed not as a commercial product, but rather as a "think piece" to explore how the potential of combining reading and writing experiences might best be utilized within the dynamic electronic environment that is possible in hypermedia. It will then show how children in a fourth grade class used this software to support their own literacy learning.

Connecting Reading, Writing, and Children's Literature within Hypermedia

As we developed this "think piece", three considerations regularly came up in our conversations: we needed to use a quality work from children's literature, we needed to design support structures that would meet the reading needs of a variety of students, and we needed to design structures that would connect reading and writing in a manner that would exploit the cognitive, pragmatic, social, and analytic potentials of this connection.

Selecting Children's Literature

The literature selection we ultimately decided to use in this project consisted of a chapter from *James and the Giant Peach* by Roald Dahl. This fantasy describes the adventures of an English boy, James, and a collection of insect friends who travel across the Atlantic on a giant peach to the U.S. The author is widely recognized for his exceptional fiction and is popular among many fourth grade students. The book we selected is commonly recommended by textbooks on children's literature (Norton, 1991; Sutherland & Arbuthnot, 1991).

We decided to use a short set of chapters rather than the entire book and then encourage students to check the book out from their library if they wanted to see how the story ended. The chapters we used describe how the adventurers learn that a school of sharks is eating their peach and how they discover a way to save themselves.

Designing Support Structures to Meet the Reading Needs of a Variety of Students

In order to determine the types of support structures to include for readers, we relied largely on cognitive and information processing models of reading (cf. Anderson & Pearson, 1984; Just & Carpenter, 1987). These led us to develop support structures in four areas important for comprehension: decoding, vocabulary, metacognition, and inferential reasoning.

Decoding and vocabulary support were provided simultaneously for words that we determined to be more challenging for students. These words were appeared in boldface in the text to make them visible to students. Clicking on any of these words would provide the pronunciation with digitized speech, and then open up a window providing a brief definition, the part of speech, and a description elaborating on the meaning of this word within the context of the story. This description often went on for several additional windows. An example of these features can be seen in Figure 1.

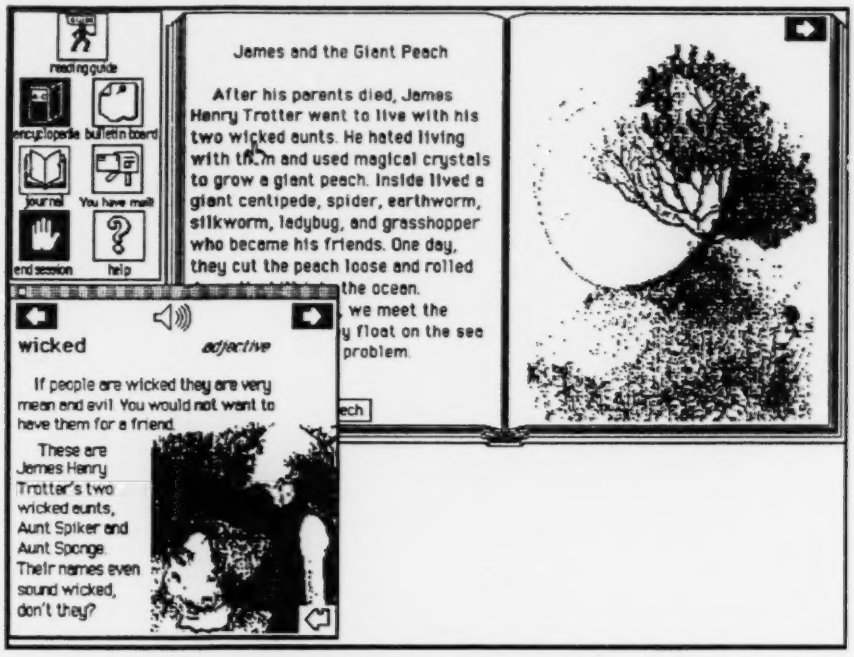
reading guide
encyclopedia
bulletin board
journal
You have mail
end session
help
James and the Giant Peach
After his parents died, James Henry Trotter went to live with his two wicked aunts. He hated living with them and used magical crystals to grow a giant peach. Inside lived a giant centipede, spider, earthworm, silkworm, ladybug, and grasshopper who became his friends. One day, they cut the peach loose and rolled
the ocean.
we meet the
y float on the sea
problem.
ech
wicked
adjective
If people are wicked they are very mean and evil. You would not want to have them for a friend.
These are James Henry Trotter's two wicked aunts, Aunt Spiker and Aunt Sponge. Their names even sound wicked, don't they?

Figure 1. An illustration of decoding and vocabulary support available during the reading of the story.

There is nothing especially unusual about the nature of our decoding and vocabulary support for readers. These types of support structures are often found in reading software. Metacognitive and inferential support, however, are not often found. Metacognitive support refers to supporting strategic knowledge demands placed on readers within dynamic, interactive environments. Knowing how to navigate within hypermedia, for example, is often a problem (Bernstein, 1991; Gay and Mazur). We tried to overcome this problem by providing students with the option of using a "Reading Guide". If students were unfamiliar with the system, they could select this feature. Doing so, opened up a new window and the system took them through a guided reading of the excerpt, explaining how each support structure worked at moments when it was most appropriate. An example of a window from a "Reading Guide" can be seen in Figure 2.

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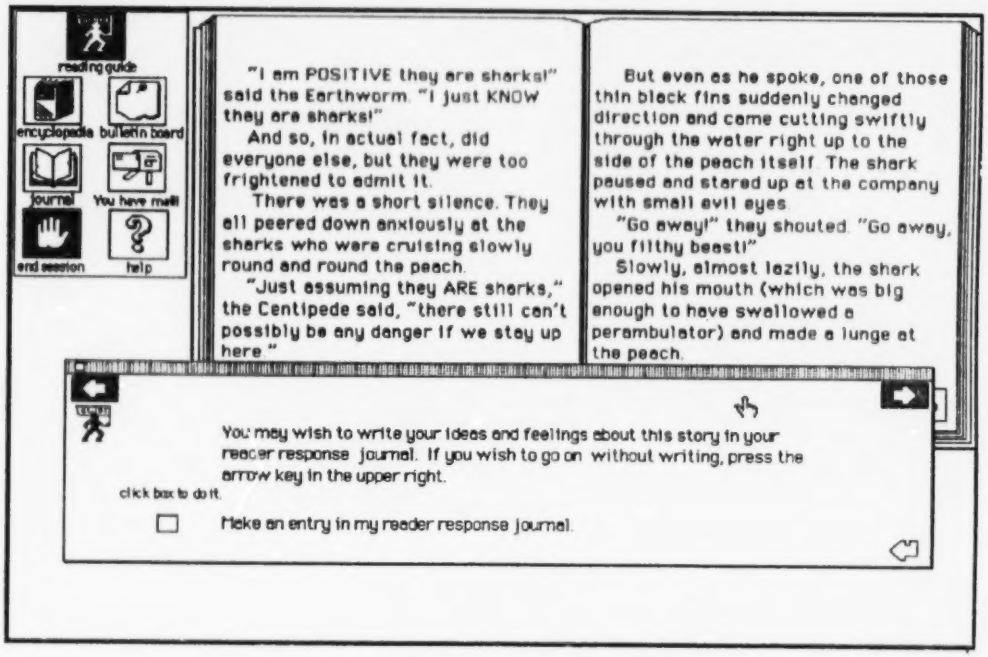
reading guide
encyclopedia
bulletin board
journal
You have mail!
end session
help
"I am POSITIVE they are sharks!" said the Earthworm. "I just KNOW they are sharks!"
And so, in actual fact, did everyone else, but they were too frightened to admit it.
There was a short silence. They all peered down anxiously at the sharks who were cruising slowly round and round the peach.
"Just assuming they ARE sharks," the Centipede said, "there still can't possibly be any danger if we stay up here."
But even as he spoke, one of those thin black fins suddenly changed direction and came cutting swiftly through the water right up to the side of the peach itself. The shark paused and stared up at the company with small evil eyes.
"Go away!" they shouted. "Go away, you filthy beast!"
Slowly, almost lazily, the shark opened his mouth (which was big enough to have swallowed a perambulator) and made a lunge at the peach.
You may wish to write your ideas and feelings about this story in your reader response journal. If you wish to go on without writing, press the arrow key in the upper right.
click box to do it.
Make an entry in my reader response journal.

Figure 2. An illustration of the "Reader's Guide" providing metacognitive support.

During this guided reading of the story, support for inferential comprehension of the passage was also provided at three locations. This was done by using a levels approach to designing comprehension questions (Leu & Kinzer, 1991). Our goal was to teach inferential processes, not simply to test inferential comprehension. We did this in three ways. First, incorrect responses to inferential questions were followed by dropping back to a literal level question, directing students to a central piece of information required in the inference. Second, after students responded to this literal level question, the central, literal information was highlighted in the text. This increased the chance they would see and make connections with this information. After students responded to this literal level question, the inferential question was again presented. We believed that drawing children's attention to central, literal information would support them in later making the correct inference. Third, following the complete sequence of responses, students received an explanation of how the inference was derived. This included both a verbal explanation and the highlighting of the appropriate information in the text. Teaching strategies for inferential reasoning and modeling these strategies is something that has not previously been included in software design.

Designing Structures to Connect Reading and Writing

As we considered ways in which to make connections between reading and writing within this environment we were guided by previous work suggesting it was important to exploit the cognitive, analytic, social, and pragmatic potentials of this environment. This led us to build several features into the design that would connect reading and writing experiences around a social-communication model and simultaneously exploit these potentials. Three design features emerged from our conversations: a reader response journal, a classroom bulletin board, and an electronic mail system.

Using a reader response journal to exploit cognitive and analytic potentials

A central aspect of our attempts to connect reading and writing was to build into the design a reader response journal. Reader response journals are often used by teachers to connect reading and writing in classrooms (Nathan & Temple, 1991). As students read a work of literature, they are encouraged to enter their thoughts and reactions to what they are reading in their journal. This allows students to draw insights useful to their cognitive development and to engage in opportunities to think critically about information they are reading.

To support students' responses in their journals, we also included a set of potential writing ideas that students could access during their reading of the story. At each location in the passage, students selecting this support option would be

presented with a list of writing ideas that were appropriate for that location. Figure 3 illustrates one student's entry in her reader response journal in response to a writing prompt.

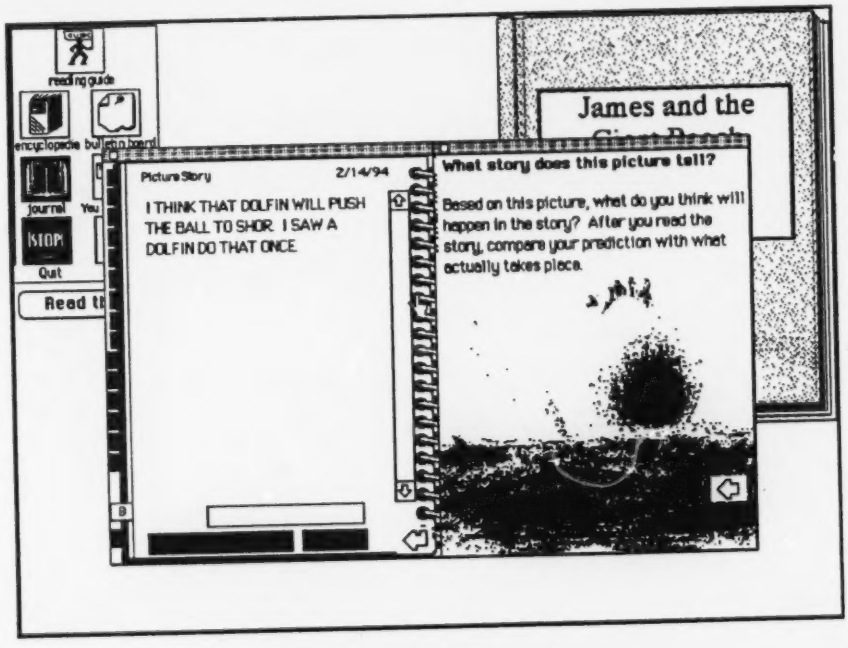
reading guide
encyclopedia
bulletin board
journal
STOP
Quit
James and the
Picture Story
2/14/94
I THINK THAT DOLFIN WILL PUSH THE BALL TO SHOR. I SAW A DOLFIN DO THAT ONCE.
What story does this picture tell?
Based on this picture, what do you think will happen in the story? After you read the story, compare your prediction with what actually takes place.

Figure 3. An illustration of a student making an entry in their reader response journal.

Using a classroom bulletin board and E-mail to exploit social potentials

Reading and writing connections should not only be made for cognitive and analytic purposes, however. It is also important to provide functional communication opportunities for students so they might understand through their reading and writing that these are fundamentally social processes. When students view reading and writing as social process they, in turn, are more likely to acquire cognitive and analytic abilities that are central to literacy proficiency (Shanahan, 1991). To accomplish these purposes, we included two types of support features into our design: a classroom bulletin board and an E-mail system.

After students had made an entry in their reader response journal, they could, of course, keep it to themselves in their journal. In addition, however, they could also send it to the classroom bulletin board to be read by others. This would lead students to developing recursive chains of reading-writing connections as one student would read the text and write a response, sending it to the bulletin board. This would be followed by another student reading the message and then writing a response to the initial posting on the bulletin board from their own reader response journal. This would be followed by still other students reading and responding in turn. An example of these written "conversations" in a bulletin board location can be seen in Figure 4.

In addition to exploiting the social potential of connecting reading and writing through an electronic classroom bulletin board, we also developed an E-mail system so that students could send confidential messages to one another about their reading experiences and other issues of personal concern. This was accomplished by opening up their reader response journal and sending an entry to another student in the class. Students received their mail in their personal "mailbox". Figure 5 provides an example of this second social feature.

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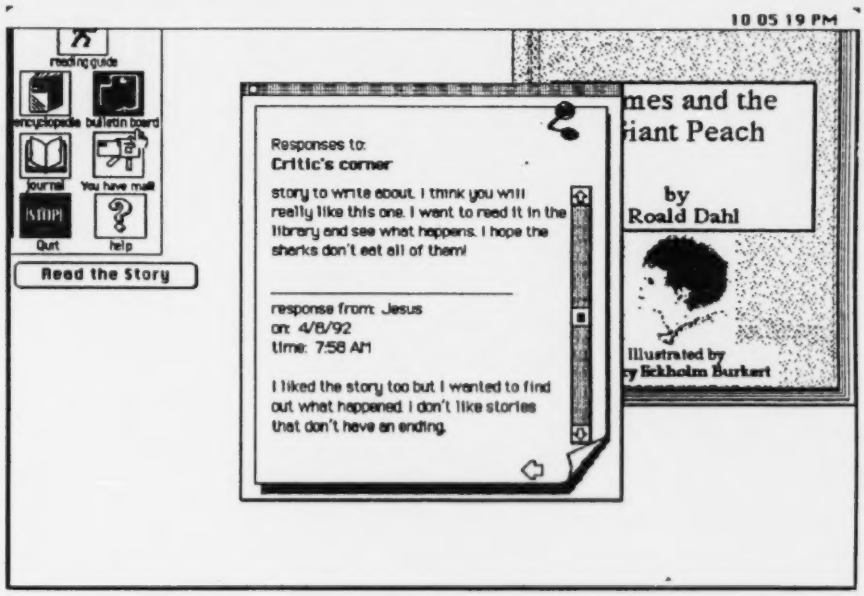
10 05 19 PM
reading guide
encyclopedia
bulletin board
journal
You have mail
STOP
Quit
help
Read the Story
Responses to:
Critic's corner
story to write about. I think you will really like this one. I want to read it in the library and see what happens. I hope the sharks don't eat all of them!
response from: Jesus
on: 4/8/92
time: 7:58 AM
I liked the story too but I wanted to find out what happened. I don't like stories that don't have an ending.
by
Roald Dahl
Illustrated by

Figure 4. An illustration of a written "conversation" in the classroom bulletin board.

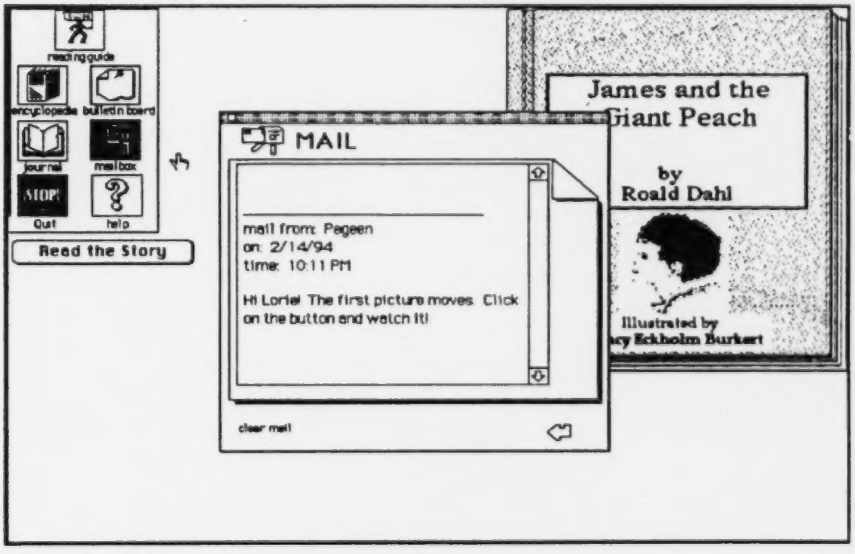

Figure 5. An example of a student receiving an E-mail message from a friend.

Connecting Reading and Writing in Hypermedia to Exploit Pragmatic Potentials

Developing this "think piece" makes it clear that multiple curricular aims may be accomplish simultaneously within software that is thoughtfully designed. This will be true, however, only if software developers pay greater attention to the instructional needs of teachers. So much of the software we have seen after working on this project appears, to us at least, to

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be technically sophisticated but instructionally out of touch with the curricular needs of teachers. Indeed, this may account for the fact that while prevalent in schools, software and other technology is not always used with great frequency (Becker, 1990; Congressional Office of Technology Assessment, 1988; Martinez & Mead, 1988; Reinking & Bridwell-Bowles, 1991). The pragmatic potentials of any design will only be fulfilled if that design is based on the curricular needs of teachers and students.

This observation is also related to a final point that emerged from our work on this project. As we watched this "think piece" being used in a fourth grade classroom it struck us that the design we used, based on the communicative potentials that appear when one connects reading and writing experiences, might best be described as generative hypermedia. Students, in their "written conversations", E-mail messages, bulletin board entries, and response journal entries were actually adding new pathways within the initial environment we had constructed. In a very real sense they were generating a new hypermedia environment by the nature of their joint interactions with the text. It may be that the generative potential we discovered in this work is the most important advantage to connecting reading and writing within hypermedia. It is through generating a new environment that students and teachers are able to adapt any initial design to meet their particular needs. As a result, it is likely that "generative" designs will more often be brought into classrooms for instructional purposes.

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